DRINKING WATER SURVEILLANCE PROGRAM

AMHERSTBURG WATER SUPPLY SYSTEM

ANNUAL REPORT 1990

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WATER SUPPLY SYSTEM

DRINKING WATER SURVEILLANCE PROGRAM

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

AMHERSTBURG WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Amherstburg water treatment plant is a conventional treatment plant which treats water from the Detroit River. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, disinfection and fluoridation. Activated carbon is added for taste and odour control. This plant has a rated capacity of 9.0 x 1000 m^3/day. The Amherstburg water supply system serves a population of approximately 16,000.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Amherstburg water treatment plant, for the sample year of 1990, produced good quality water and this was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW TESTS	RAW POSITIVE	RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE	SITE 2 TESTS	SITE 2 POSITIVE	SITE 2 %POSITIVE
BACTERIOLOGICAL	18	18	100	6	0	0	6	0	0	4	2	50
CHEMISTRY (FLD)	18	17	94	36	36	100	72	72	100	46	46	100
CHEMISTRY (LAB)	132	113	85	128	95	74	219	187	85	148	124	83
METALS	144	57	39	144	47	32	276	113	40	184	74	40
CHLOROAROMATICS	84	0	0	84	0	0	84	0	0	56	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.	.	.	.
PAH	83	0	0	66	0	0	17	0	0	.	.	.
PESTICIDES & PCB	204	0	0	204	0	0	127	0	0	85	0	0
PHENOLICS	5	1	20	5	1	20	.	.	.	.	.	.
SPECIFIC PESTICIDES	50	0	0	38	0	0	6	0	0	4	0	0
VOLATILES	174	0	0	174	24	13	174	24	13	116	16	13
TOTAL	924	206		897	203		981	396		643	262	

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DRINKING WATER SURVEILLANCE PROGRAM

AMHERSTBURG WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Amherstburg water treatment plant in the spring of 1985 as part of a study on the St.Clair/Detroit River area. Previous annual reports have been published for 1986, 1987, 1988 and 1989.

PLANT DESCRIPTION

The Amherstburg water treatment plant is a conventional treatment plant which treats water from the Detroit River. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration and disinfection. Powdered activated carbon is added for taste and odour control. This plant has a rated capacity of 9.0 x 1000 m^3/day. The Amherstburg water supply system serves a population of approximately 16,000.

The sample day flows ranged from 6.2 x 1000 m^3/day to 9.1 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic

compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be

confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may

increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 5 of 15 treated and distributed water samples with a maximum reported value of 22.0°C.

CHEMISTRY (LAB)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 16 of 16 treated and distributed water samples with a maximum reported value of 134.0 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as Al in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 1 of 6 treated water samples. The exceedence occurred in July at 110.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatics scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenols scan showed that none were detected.

POLYAROMATICS HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the pesticides & PCB scan showed that none were detected.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 16 treated and distributed water samples analyzed with a maximum level of 30.8 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Amherstburg water treatment plant, for the sample year of 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

AMHERSTBURG WATER TREATMENT PLANT

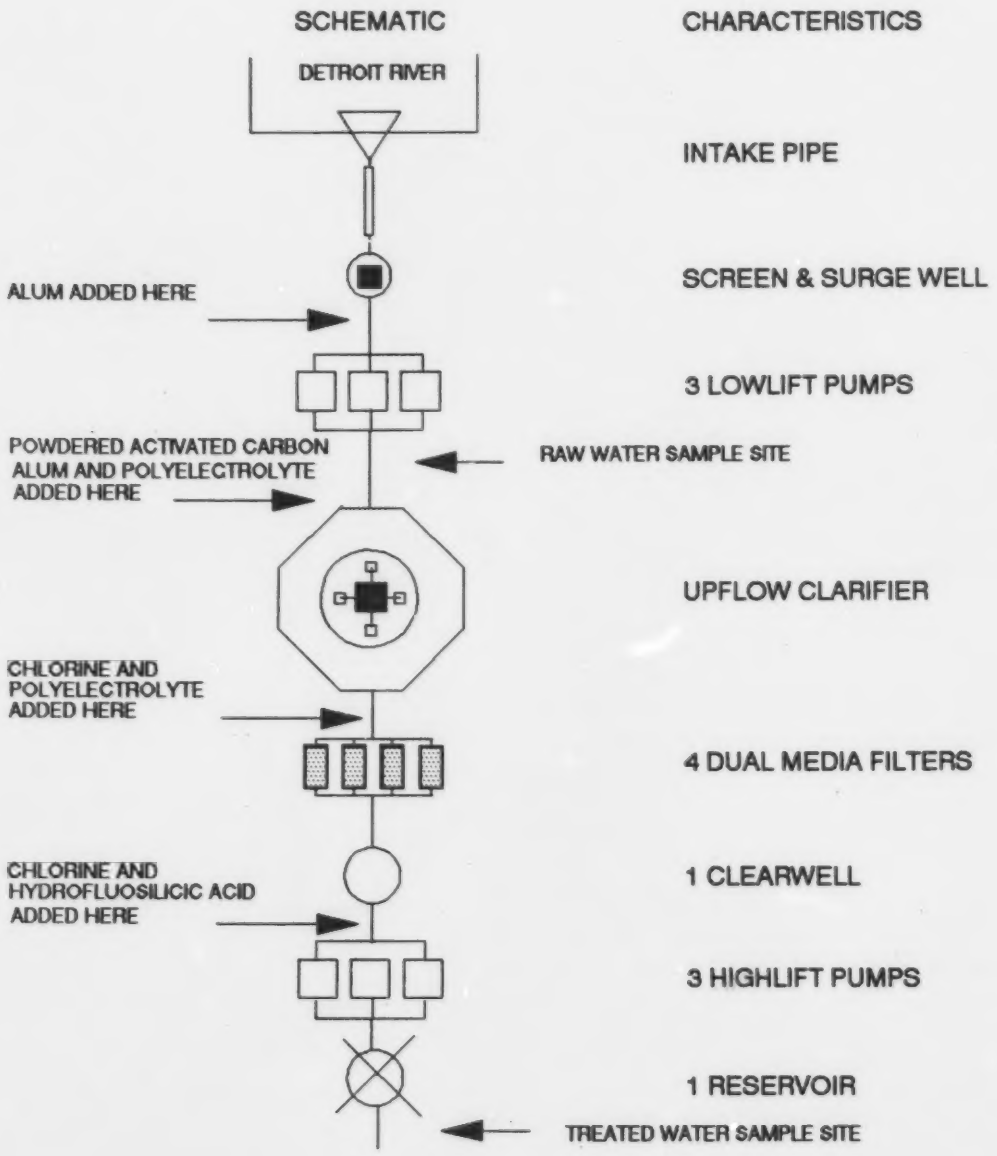

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 210000149
PLANT NAME: AMHERSTBURG WATER SUPPLY SYSTEM

DISTRICT: WINDSOR
REGION: SOUTHWEST
DISTRICT OFFICER :J. DRUMMOND

UTM #: 173253004665675

PLANT SUPERINTENDENT: LOUIS SINGER

ADDRESS: 415 FRONT RD NORTH
AMHERSTBURG, ONT
N9V 2V5
(519 736 5447)

MUNICIPALITY: AMHERSTBURG
AUTHORITY: PROVINCIAL

PLANT INFORMATION

PLANT VOLUME:	18.387	(X 1000 M3)
DESIGN CAPACITY:	18.180	(X 1000 M3/DAY)
RATED CAPACITY:	9.000	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
AMHERSTBURG	8,385
ANDERDON	3,822
COLCHESTER	1,944
MALDEN	1,800

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
ALUMINUM	AFTER FILTERS	DIALY
COMBINED CHLORINE RESIDUAL	AFTER FILTERS	DAILY READING
	TREATED WATER	DAILY READING
FREE CHLORINE RESIDUAL	AFTER FILTERS	EVERY 4 HOURS
	TREATED WATER	EVERY 4 HOURS
TOTAL CHLORINE RESIDUAL	TREATED WATER	EVERY 8 HOURS
FLUORIDE	TREATED WATER	EVERY 4 HOURS
PH	RAW WATER	DAILY READING
	TREATED WATER	DAILY READING
TEMPERATURE	RAW WATER	DAILY READING
	TREATED WATER	DAILY READING
TURBIDITY	AFTER CLARIFIERS	EVERY 4 HOURS
	AFTER FILTERS	EVERY 4 HOURS
	RAW WATER	EVERY 4 HOURS
	TREATED WATER	EVERY 4 HOURS

DRINKING WATER SURVEILLANCE PROGRAM

TABLE 3
AMHERSTBURG WSS SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGES (MG/L)					
			PRE CHLORINATION	COAGULATION	COAGULATION AID	TASTE & ODOUR	FILTER AID	POST CHLORINATION	FLUORIDATION
			CHLORINE	ALUM LIQUID	POLYELECTROLYTE	ACTIVATED CARBON POW	POLYELECTROLYTE	CHLORINE	HYDROFLUOSILICIC ACI
DATE	DELAY * TIME(HRS)	FLOW (1000M3)							
JAN 18	48.00	6.230	1.74	41.46	.18	6.09	.05	.56	1.21
MAR 21	48.00	6.550	1.87	49.60	.20	6.55	.05	.55	1.18
MAY 24	48.00	7.730	1.60	50.08	.17	5.50	.04	.44	.86
JUL 18	48.00	9.140	1.66	25.10	.13	4.50	.04	.48	.97
SEP 19	48.00	7.730	1.07	61.90	.14	9.60	.04	.51	.97
NOV 21	48.00	6.770	2.00	52.80	.17	5.80	.05	.49	.93

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL												
FECAL COLIFORM MF	6	6	0	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	6	0	0	6	0	0	4	2	0
TOTAL COLIFORM MF	6	6	0	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	6	6	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	18	18	0	6	0	0	6	0	0	4	2	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	.	.	.	6	6	0	12	12	0	8	8	0
FLD CHLORINE FREE	.	.	.	6	6	0	12	12	0	8	8	0
FLD CHLORINE (TOTAL)	.	.	.	6	6	0	12	12	0	8	8	0
FLD PH	6	6	0	6	6	0	12	12	0	8	8	0
FLD TEMPERATURE	6	5	0	6	6	0	12	12	0	6	6	0
FLD TURBIDITY	6	6	0	6	6	0	12	12	0	8	8	0
*TOTAL SCAN CHEMISTRY (FLD)	18	17	0	36	36	0	72	72	0	46	46	0
CHEMISTRY (LAB)												
ALKALINITY	6	6	0	6	6	0	12	12	0	8	8	0
CALCIUM	6	6	0	6	6	0	12	12	0	8	8	0
CYANIDE	6	0	0	6	0	0	.	.	.	.	.	.
CHLORIDE	6	6	0	6	6	0	12	12	0	8	8	0
COLOUR	6	1	5	6	0	2	12	1	11	8	0	4
CONDUCTIVITY	6	6	0	6	6	0	12	12	0	8	8	0
DISS ORG CARBON	6	6	0	6	6	0	12	12	0	8	8	0
FLUORIDE	6	6	0	6	6	0	12	12	0	8	8	0
HARDNESS	6	6	0	6	6	0	12	12	0	8	8	0
IONCAL	6	6	0	6	6	0	12	12	0	8	8	0
LANGELIERS INDEX	6	6	0	2	2	0	3	3	0	4	4	0
MAGNESIUM	6	6	0	6	6	0	12	12	0	8	8	0
SODIUM	6	6	0	6	6	0	12	12	0	8	8	0
AMMONIUM TOTAL	6	2	2	6	0	1	12	1	1	8	0	3
NITRITE	6	5	1	6	1	2	12	2	8	8	0	6
TOTAL NITRATES	6	6	0	6	6	0	12	12	0	8	8	0
NITROGEN TOT KJELD	6	6	0	6	5	1	12	12	0	8	8	0
PH	6	6	0	6	6	0	12	12	0	8	8	0
PHOSPHORUS FIL REACT	6	4	1	6	2	1	.	.	.	.	.	.
PHOSPHORUS TOTAL	6	5	1	6	1	3	.	.	.	.	.	.
SULPHATE	6	6	0	6	6	0	12	12	0	8	8	0
TURBIDITY	6	6	0	6	6	0	12	12	0	8	8	0
*TOTAL SCAN CHEMISTRY (LAB)	132	113	10	128	95	10	219	187	20	148	124	13

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS												
SILVER	6	0	0	6	0	0	12	0	1	8	0	1
ALUMINUM	6	6	0	6	6	0	12	12	0	8	8	0
ARSENIC	6	0	5	6	0	5	12	0	10	8	0	6
BARIUM	6	6	0	6	6	0	12	12	0	8	8	0
BORON	6	3	3	6	6	0	12	10	2	8	6	2
BERYLLIUM	6	0	0	6	0	0	12	0	0	8	0	0
CADMIUM	6	0	1	6	0	0	12	0	6	8	0	1
COBALT	6	0	6	6	0	5	12	0	10	8	0	5
CHROMIUM	6	0	5	6	0	5	12	0	10	8	0	6
COPPER	6	4	2	6	0	4	12	12	0	8	8	0
IRON	6	5	1	6	0	0	12	2	10	8	0	3
MERCURY	6	0	0	6	0	1	.	.	.	.	.	.
MANGANESE	6	6	0	6	5	1	12	12	0	8	6	2
MOLYBDENUM	6	2	4	6	6	0	12	12	0	8	8	0
NICKEL	6	0	5	6	0	1	12	0	8	8	0	4
LEAD	6	5	1	6	0	3	12	6	6	8	2	6
ANTIMONY	6	0	6	6	1	5	12	2	10	8	3	5
SELENIUM	6	0	0	6	0	3	12	0	6	8	0	3
STRONTIUM	6	6	0	6	6	0	12	12	0	8	8	0
TITANIUM	6	4	2	6	3	3	12	6	6	8	2	6
THALLIUM	6	0	0	6	0	0	12	0	0	8	0	0
URANIUM	6	0	6	6	0	2	12	0	3	8	0	1
VANADIUM	6	4	2	6	6	0	12	5	7	8	7	1
ZINC	6	6	0	6	2	4	12	10	2	8	8	0
*TOTAL SCAN METALS	144	57	49	144	47	42	276	113	97	184	74	52
*TOTAL GROUP INORGANIC & PHYSICAL	294	187	59	308	178	52	567	372	117	378	244	65
CHLOROAROMATICS												
HEXACHLOROBUTADIENE	6	0	0	6	0	0	6	0	0	4	0	0
123 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	4	0	0
1234 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	4	0	0
1235 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	4	0	0
124 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	4	0	0
1245 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	4	0	0
135 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	4	0	0
HCB	6	0	0	6	0	0	6	0	0	4	0	0
HEXACHLOROETHANE	6	0	0	6	0	1	6	0	1	4	0	1
OCTACHLOROSTYRENE	6	0	0	6	0	0	6	0	0	4	0	0
PENTACHLOROBENZENE	6	0	0	6	0	0	6	0	0	4	0	0
236 TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	4	0	0
245 TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	4	0	0
26A TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	4	0	0
*TOTAL SCAN CHLOROAROMATICS	84	0	0	84	0	1	84	0	1	56	0	1
CHLOROPHENOLS												

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0	0	0
PAH												
PHENANTHRENE	5	0	0	4	0	0	1	0	0	.	.	.
ANTHRACENE	4	0	0	3	0	0	1	0	0	.	.	.
FLUORANTHENE	5	0	0	4	0	0	1	0	0	.	.	.
PYRENE	5	0	0	4	0	0	1	0	0	.	.	.
BENZO(A)ANTHRACENE	5	0	0	4	0	0	1	0	0	.	.	.
CHRYSENE	5	0	0	4	0	0	1	0	0	.	.	.
DIMETH. BENZ(A)ANTHR	4	0	0	3	0	0	1	0	0	.	.	.
BENZO(E) PYRENE	5	0	0	4	0	0	1	0	0	.	.	.
BENZO(B) FLUORANTHEN	5	0	0	4	0	0	1	0	0	.	.	.
PERYLENE	5	0	0	4	0	0	1	0	0	.	.	.
BENZO(K) FLUORANTHEN	5	0	0	4	0	0	1	0	0	.	.	.
BENZO(A) PYRENE	5	0	0	4	0	0	1	0	0	.	.	.
BENZO(G,H,I) PERYLEN	5	0	0	4	0	0	1	0	0	.	.	.
DIBENZO(A,H) ANTHRAC	5	0	0	4	0	0	1	0	0	.	.	.
INDENO(1,2,3-C,D) PY	5	0	0	4	0	0	1	0	0	.	.	.
BENZO(B) CHRYSENE	5	0	0	4	0	0	1	0	0	.	.	.
CORONENE	5	0	0	4	0	0	1	0	0	.	.	.
*TOTAL SCAN PAH	83	0	0	66	0	0	17	0	0	0	0	0
PESTICIDES & PCB												
ALDRIN	6	0	0	6	0	0	6	0	0	4	0	0
ALPHA BHC	6	0	5	6	0	0	6	0	0	4	0	0
BETA BHC	6	0	0	6	0	0	6	0	0	4	0	0
LINDANE	6	0	1	6	0	0	6	0	0	4	0	0
ALPHA CHLORDANE	6	0	0	6	0	0	6	0	0	4	0	0
GAMMA CHLORDANE	6	0	0	6	0	0	6	0	0	4	0	0
DIELDRIN	6	0	0	6	0	0	6	0	0	4	0	1
METHOXYCHLOR	6	0	0	6	0	0	6	0	0	4	0	0
ENDOSULFAN I	6	0	0	6	0	0	6	0	0	4	0	0
ENDOSULFAN II	6	0	0	6	0	0	6	0	0	4	0	0
ENDRIN	6	0	0	6	0	0	6	0	0	4	0	0
ENDOSULFAN SULPHATE	6	0	0	6	0	0	6	0	0	4	0	0
HEPTACHLOR EPOXIDE	6	0	0	6	0	0	6	0	0	4	0	0
HEPTACHLOR	6	0	0	6	0	0	6	0	0	4	0	0
MIREX	6	0	0	6	0	0	6	0	0	4	0	0
OXYCHLORDANE	6	0	0	6	0	0	6	0	0	4	0	0
OPDDT	6	0	0	6	0	0	6	0	0	4	0	0
PCB	6	0	0	6	0	0	6	0	0	4	0	0
DDD	6	0	0	6	0	0	6	0	0	4	0	0
PPDDE	6	0	0	6	0	0	6	0	0	4	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	6	0	0	6	0	0	6	0	0	4	0	0
AMETRINE	6	0	0	6	0	0	.	.	.	.	.	.
ATRAZINE	6	0	3	6	0	0	.	.	.	.	.	.
ATRATONE	6	0	0	6	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	6	0	0	6	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	6	0	0	6	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	5	0	0	5	0	0	.	.	.	.	.	.
PROMETONE	6	0	0	6	0	0	.	.	.	.	.	.
PROPAZINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETRYNE	6	0	0	6	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	6	0	0	6	0	0	.	.	.	.	.	.
SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	6	0	0	6	0	0	.	.	.	.	.	.
METOLACHLOR	6	0	0	6	0	0	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	1	0	0	1	0	0	1	0	0	1	0	0
*TOTAL SCAN PESTICIDES & PCB	204	0	9	204	0	0	127	0	0	85	0	1
PHENOLICS												
PHENOLICS	5	1	2	5	1	1	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	5	1	2	5	1	1	0	0	0	0	0	0
SPECIFIC PESTICIDES												
TOXAPHENE	6	0	0	6	0	0	6	0	0	4	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.	.	.	.
DICAMBA	2	0	0	2	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.	.	.	.
DIAZINON	2	0	0	1	0	0	.	.	.	.	.	.
DICHLOROVOS	2	0	0	1	0	0	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	1	0	0	.	.	.	.	.	.
ETHION	2	0	0	1	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	2	0	0	1	0	0	.	.	.	.	.	.
MEVINPHOS	2	0	0	1	0	0	.	.	.	.	.	.
METHYL PARATHION	2	0	0	1	0	0	.	.	.	.	.	.
METHYLTRITHION	2	0	0	1	0	0	.	.	.	.	.	.
PARATHION	2	0	0	1	0	0	.	.	.	.	.	.
PHORATE	2	0	0	1	0	0	.	.	.	.	.	.
RELDAN	2	0	0	1	0	0	.	.	.	.	.	.
RONNEL	2	0	0	1	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENOMYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	1	0	0	1	0	0	.	.	.	.	.	.
CICP	1	0	0	1	0	0	.	.	.	.	.	.
DIALLATE	1	0	0	1	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	1	0	0	1	0	0	.	.	.	.	.	.
IPC	1	0	0	1	0	0	.	.	.	.	.	.
PROPOXUR	1	0	0	1	0	0	.	.	.	.	.	.
CARBARYL	1	0	0	1	0	0	.	.	.	.	.	.
BUTYLATE	1	0	0	1	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	50	0	0	38	0	0	6	0	0	4	0	0
VOLATILES												
BENZENE	6	0	1	6	0	0	6	0	1	4	0	1
TOLUENE	6	0	2	6	0	0	6	0	0	4	0	0
ETHYLBENZENE	6	0	2	6	0	2	6	0	3	4	0	1
P-XYLENE	6	0	0	6	0	0	6	0	0	4	0	0
M-XYLENE	6	0	1	6	0	0	6	0	0	4	0	0
O-XYLENE	6	0	2	6	0	0	6	0	0	4	0	0
STYRENE	6	0	4	6	0	0	6	0	1	4	0	0
1,1 DICHLOROETHYLENE	6	0	0	6	0	0	6	0	0	4	0	0
METHYLENE CHLORIDE	6	0	0	6	0	0	6	0	0	4	0	0
T1,2DICHLOROETHYLENE	6	0	0	6	0	0	6	0	0	4	0	0
1,1 DICHLOROETHANE	6	0	0	6	0	0	6	0	0	4	0	0
CHLOROFORM	6	0	0	6	6	0	6	6	0	4	4	0
111, TRICHLOROETHANE	6	0	1	6	0	1	6	0	0	4	0	1
1,2 DICHLOROETHANE	6	0	0	6	0	0	6	0	0	4	0	0
CARBON TETRACHLORIDE	6	0	0	6	0	0	6	0	0	4	0	0
1,2 DICHLOROPROPANE	6	0	0	6	0	0	6	0	0	4	0	0
TRICHLOROETHYLENE	6	0	0	6	0	0	6	0	0	4	0	0
DICHLOROBROMOMETHANE	6	0	0	6	6	0	6	6	0	4	4	0
112 TRICHLOROETHANE	6	0	0	6	0	0	6	0	0	4	0	0
CHLORODIBROMOMETHANE	6	0	0	6	6	0	6	6	0	4	4	0
T-CHLOROETHYLENE	6	0	2	6	0	1	6	0	0	4	0	0
BROMOFORM	6	0	0	6	0	6	6	0	6	4	0	4
1122 T-CHLOROETHANE	6	0	0	6	0	0	6	0	0	4	0	0
CHLOROBENZENE	6	0	0	6	0	0	6	0	0	4	0	0
1,4 DICHLOROBENZENE	6	0	0	6	0	0	6	0	0	4	0	0
1,3 DICHLOROBENZENE	6	0	0	6	0	0	6	0	0	4	0	0
1,2 DICHLOROBENZENE	6	0	0	6	0	0	6	0	0	4	0	0
ETHLYENE DIBROMIDE	6	0	0	6	0	0	6	0	0	4	0	0
TOTL TRIHALOMETHANES	6	0	0	6	6	0	6	6	0	4	4	0
*TOTAL SCAN VOLATILES	174	0	15	174	24	10	174	24	11	116	16	7
*TOTAL GROUP ORGANIC	612	1	26	583	25	12	408	24	12	261	16	9

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SH	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS 1990

		WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 0 (A1)		
JAN	332	.	.	.	.	.
MAR	192	.	.	.	.	.
MAY	52	.	.	.	.	.
JUL	36	.	.	.	.	.
SEP	56	.	.	.	.	.
NOV	960	.	.	.	.	.
STANDRD PLATE CNT MF (COUNTS/ML)			DET'N LIMIT = 0	GUIDELINE = 500/ML (A3)		
JAN	.	1 <=>	.	3 <=>	.	2 <=
MAR	.	1 <=>	.	6 <=>	.	37
MAY	.	0 <=>	.	0 <=>	.	.
JUL	.	0 <=>	.	0 <=>	.	.
SEP	.	0 <=>	.	0 <=>	.	0 <=
NOV	.	1 <=>	.	1 <=>	.	44
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 5/100ML(A1)		
JAN	8700	.	.	.	.	.
MAR	2100	.	.	.	.	.
MAY	1100	.	.	.	.	.
JUL	200	.	.	.	.	.
SEP	2400	.	.	.	.	.
NOV	7900	.	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	35000	.	.	.	.	.
MAR	19900	.	.	.	.	.
MAY	10000	.	.	.	.	.
JUL	21000	.	.	.	.	.
SEP	46000	.	.	.	.	.
NOV	51000	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS 1990

		WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0		GUIDELINE = N/A	
JAN	.	.210	.200	.200	.100	.200
MAR	.	.170	.200	.200	.300	.200
MAY	.	.200	.200	.200	.	.
JUL	.	.200	.200	.200	.	.
SEP	.	.210	.200	.200	.100	.100
NOV	.	.360	.200	.200	.190	.220
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0		GUIDELINE = N/A	
JAN	.	.780	.300	.500	.400	.500
MAR	.	.780	.100	.300	.300	.500
MAY	.	.800	.100	.300	.	.
JUL	.	.800	.100	.300	.	.
SEP	.	.850	.100	.300	.100	.150
NOV	.	.670	.100	.500	.080	.450
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0		GUIDELINE = N/A	
JAN	.	.990	.500	.700	.500	.700
MAR	.	.950	.300	.500	.600	.700
MAY	.	1.000	.300	.500	.	.
JUL	.	1.000	.300	.500	.	.
SEP	.	1.060	.300	.500	.200	.250
NOV	.	1.030	.300	.700	.270	.670
FLD PH (DMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)	
JAN	7.900	6.900	7.200	7.000	7.100	7.200
MAR	7.800	6.900	7.000	7.000	6.900	7.000
MAY	8.000	6.900	7.000	7.000	.	.
JUL	8.000	7.100	7.200	7.400	.	.
SEP	8.200	7.000	7.200	7.000	7.200	7.400
NOV	8.000	7.000	7.200	7.000	7.200	7.000
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A		GUIDELINE = 15 (A3)	
JAN	.000	1.000	8.000	4.000	7.000	5.000
MAR	3.000	5.000	8.000	8.000	.	.
MAY	12.000	14.000	13.000	13.000	.	.
JUL	21.000	22.000	18.000	20.000	.	.
SEP	19.000	20.000	17.000	21.000	18.000	21.000
NOV	6.000	7.000	13.000	12.000	13.000	12.000
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A		GUIDELINE = 1 (A1)	
JAN	2.800	.030	.260	.140	.150	.130
MAR	10.100	.060	.210	.320	.250	.240
MAY	35.800	.040	.130	.120	.	.
JUL	11.800	.070	.160	.120	.	.
SEP	19.200	.050	.130	.100	.160	.130
NOV	22.300	.050	.440	.170	.480	.150

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)		
JAN	89.200	70.500	73.100	73.100	74.200	73.800
MAR	90.100	72.400	73.900	72.600	74.700	74.600
MAY	84.300	71.200	71.600	72.600	.	.
JUL	89.600	76.400	77.900	78.300	.	.
SEP	87.200	61.000	63.200	63.100	67.200	66.100
NOV	92.800	77.700	79.500	78.800	81.500	85.200
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)		
JAN	31.600	33.000	32.000	32.400	32.400	32.200
MAR	30.400	30.700	31.500	31.500	33.700	32.900
MAY	34.200	34.400	34.000	35.000	.	.
JUL	33.100	31.700	32.800	33.400	.	.
SEP	31.600	31.600	33.600	33.800	36.000	36.400
NOV	33.600	35.400	36.200	36.000	38.400	39.600
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)		
JAN	14.200	17.200	15.100	15.200	14.900	14.800
MAR	11.800	14.700	14.700	14.600	15.200	15.200
MAY	23.700	14.400	13.500	13.500	.	.
JUL	13.900	12.500	13.900	13.600	.	.
SEP	13.200	13.900	14.800	14.500	15.200	14.900
NOV	9.800	12.300	12.300	12.200	12.700	13.200
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)		
JAN	2.000 <T	BDL	1.000 <T	1.000 <T	BDL	.500 <T
MAR	.500 <T	BDL	1.000 <T	2.500	BDL	.500 <T
MAY	1.000 <T	.500 <T	1.500 <T	1.500 <T	.	.
JUL	1.500 <T	BDL	.500 <T	.500 <T	.	.
SEP	5.000	.500 <T	.500 <T	.500 <T	BDL	.500 <T
NOV	.500 <T	BDL	.500 <T	1.000 <T	BDL	1.000 <T
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)		
JAN	256	274	263	263	263	263
MAR	250	269	274	271	280	280
MAY	251	273	268	269	.	.
JUL	267	255	265	265	.	.
SEP	251	261	275	275	282	279
NOV	250	280	288	284	295	306
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)		
JAN	1.800	1.200	1.200	1.100	1.100	1.100
MAR	1.700	1.000	1.100	1.000	1.000	1.100
MAY	1.800	1.200	1.200	1.200	.	.
JUL	2.000	1.300	1.300	1.200	.	.
SEP	2.200	1.100	1.100	.900	1.000	1.000
NOV	1.900	1.300	1.200	1.200	1.200	1.100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)		
JAN	.100	1.220	.840	.860	.860	.880
MAR	.080	.900	.820	.840	.840	.820
MAY	.080	1.040	.900	.920	.	.
JUL	.100	1.140	1.080	1.100	.	.
SEP	.100	.980	1.000	1.040	1.060	1.040
NOV	.080	1.040	.960	.980	.980	.960
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)		
JAN	113.000	118.000	114.000	115.000	114.000	114.000
MAR	109.500	110.400	112.000	112.600	115.300	115.700
MAY	122.000	120.000	119.000	123.000	.	.
JUL	118.400	113.300	116.300	117.200	.	.
SEP	113.000	112.000	119.000	119.000	123.000	125.000
NOV	117.000	124.000	127.000	125.000	132.000	134.000
IONCAL (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
JAN	1.464	5.304	3.133	3.319	1.586	3.619
MAR	2.404	1.964	1.066	7.327	3.295	.997
MAY	2.595	4.430	4.068	6.389	.	.
JUL	2.507	2.815	2.397	3.513	.	.
SEP	.721	2.488	2.305	2.380	3.264	5.276
NOV	1.874	2.000	1.465	1.397	2.472	.457
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
JAN	.218	.008	.014	.040	.086	.141
MAR	.138	-.520	-.412	-.388	-.300	-.331
MAY	.180	-.429	-.370	-.272	.	.
JUL	.216	-.017	-.018	.002	.	.
SEP	.090	-.629	-.542	-.470	-.258	-.189
NOV	.244	.048	-.085	-.100	.128	.067
MAGNESIUM (MG/L)			DET'N LIMIT = 0.1	GUIDELINE = 30 (F2)		
JAN	8.300	8.600	8.300	8.200	8.000	8.300
MAR	8.150	8.200	8.100	8.250	8.200	8.150
MAY	8.900	8.300	8.300	8.600	.	.
JUL	8.700	8.300	8.350	8.200	.	.
SEP	8.300	8.200	8.400	8.300	8.200	8.300
NOV	8.100	8.700	8.900	8.600	8.800	8.600
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)		
JAN	8.600	9.400	8.200	8.400	7.800	8.200
MAR	8.100	8.800	8.900	11.800	9.000	9.100
MAY	6.600	7.200	7.000	7.000	.	.
JUL	8.400	6.200	7.000	7.000	.	.
SEP	7.600	6.800	7.400	7.600	7.800	7.800
NOV	6.000	6.600	6.600	6.600	7.000	7.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)		
JAN	.034	BDL	BDL	BDL	BDL	BDL
MAR	.014	BDL	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL	.	.
JUL	.004 <T	.004 <T	.002 <T	BDL	.	.
SEP	BDL	BDL	.018	BDL	.004 <T	.004 <T
NOV	.004 <T	BDL	BDL	BDL	BDL	.002 <T
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)		
JAN	.006	BDL	.001 <T	BDL	BDL	BDL
MAR	.008	BDL	.003 <T	.002 <T	.001 <T	.001 <T
MAY	.019	.006	.006	.006	.	.
JUL	.039	BDL	.001 <T	BDL	.	.
SEP	.003 <T	.001 <T	.004 <T	.003 <T	.003 <T	.002 <T
NOV	.023	.001 <T	.001 <T	.001 <T	.001 <T	.001 <T
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)		
JAN	.465	.590	.470	.470	.470	.465
MAR	.695	.790	.820	.785	.895	.900
MAY	.670	.800	.740	.740	.	.
JUL	.645	.520	.585	.565	.	.
SEP	.985	.420	.465	.455	.465	.475
NOV	.635	.895	.905	.895	1.010	1.020
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
JAN	.230	.130	.120	.120	.130	.100
MAR	.270	.110	.140	.160	.130	.150
MAY	.290	.100	.100	.110	.	.
JUL	.290	.110	.110	.170	.	.
SEP	.310	.090 <T	.170	.110	.100	.120
NOV	.330	.120	.150	.120	.140	.140
PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
JAN	8.190	8.070	8.070	8.090	8.130	8.190
MAR	8.120	7.560	7.650	7.680	7.730	7.710
MAY	8.140	7.610	7.670	7.750	.	.
JUL	8.170	8.020	8.000	8.010	.	.
SEP	8.070	7.510	7.560	7.630	7.790	7.860
NOV	8.170	8.040	7.890	7.880	8.070	7.980
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005	GUIDELINE = N/A		
JAN	.008	.007	.	.	.	.
MAR	.000 <T	BDL	.	.	.	.
MAY	.018	.003	.	.	.	.
JUL	.007	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	.008	.000 <T	.	.	.	.

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002		GUIDELINE = .40 (F2)	
JAN	.009 <T	.010	.	.	.	.
MAR	.013	BDL	.	.	.	.
MAY	.039	.002 <T	.	.	.	.
JUL	.030	.003 <T	.	.	.	.
SEP	.030	BDL	.	.	.	.
NOV	.045	.006 <T	.	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200		GUIDELINE = 500 (A3)	
JAN	18.280	32.990	30.500	31.090	30.530	30.120
MAR	14.270	29.850	31.100	31.520	32.390	33.490
MAY	18.950	34.160	34.310	34.010	.	.
JUL	20.960	26.320	27.640	27.210	.	.
SEP	18.520	40.550	44.020	44.890	44.020	44.230
NOV	18.200	36.050	37.660	36.950	39.080	39.680
TURBIDITY (FTU)			DET'N LIMIT = 0.05		GUIDELINE = 1 (A1)	
JAN	2.200	.400	.850	.250	.300	.350
MAR	7.900	.300	.450	.390	.450	.550
MAY	26.000	.240	.290	.460	.	.
JUL	12.500	.300	.350	.250	.	.
SEP	22.000	.390	.550	.330	.360	.300
NOV	27.000	.270	.530	.260	.250	.730

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
SILVER (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A1)		
JAN	BDL	BDL	.060 <T	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL	.	.
JUL	BDL	BDL	BDL	BDL	.	.
SEP	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	.060 <T	BDL
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)		
JAN	29.000	19.000	24.000	16.000	19.000	17.000
MAR	110.000	19.000	18.000	17.000	18.000	16.000
MAY	220.000	36.000	28.000	28.000	.	.
JUL	160.000	110.000	48.000	72.000	.	.
SEP	220.000	25.000	27.000	29.000	32.000	31.000
NOV	210.000	17.000	20.000	19.000	19.000	21.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)		
JAN	.590 <T	.590 <T	.550 <T	.490 <T	.820 <T	.600 <T
MAR	.480 <T	.500 <T	.250 <T	.220 <T	.260 <T	.430 <T
MAY	.610 <T	.430 <T	.490 <T	.490 <T	.	.
JUL	.970 <T	.560 <T	.390 <T	.510 <T	.	.
SEP	BDL	BDL	BDL	BDL	BDL	BDL
NOV	.700 <T	.520 <T	.360 <T	.640 <T	.680 <T	.810 <T
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)		
JAN	16.000	17.000	17.000	17.000	17.000	16.000
MAR	16.000	16.000	16.000	16.000	16.000	15.000
MAY	18.000	18.000	17.000	17.000	.	.
JUL	21.000	20.000	20.000	20.000	.	.
SEP	19.000	19.000	21.000	21.000	21.000	21.000
NOV	17.000	16.000	16.000	17.000	17.000	18.000
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)		
JAN	17.000 <T	21.000	23.000	19.000 <T	19.000 <T	18.000 <T
MAR	15.000 <T	28.000	28.000	18.000 <T	31.000	27.000
MAY	23.000	91.000	94.000	91.000	.	.
JUL	38.000	26.000	35.000	37.000	.	.
SEP	30.000	39.000	45.000	42.000	42.000	42.000
NOV	18.000 <T	22.000	25.000	22.000	22.000	22.000
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
JAN	BDL	BDL	.140 <T	BDL	BDL	BDL
MAR	BDL	BDL	.060 <T	BDL	BDL	BDL
MAY	BDL	BDL	.090 <T	BDL	.	.
JUL	BDL	BDL	.110 <T	BDL	.	.
SEP	.070 <T	BDL	.140 <T	BDL	BDL	BDL
NOV	BDL	BDL	.090 <T	BDL	BDL	.070 <T

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
JAN	.130 <T	.110 <T	.140 <T	.070 <T	.110 <T	.070 <T
MAR	.260 <T	BDL	BDL	BDL	BDL	BDL
MAY	.300 <T	.140 <T	.140 <T	.140 <T	.	.
JUL	.240 <T	.070 <T	.080 <T	.050 <T	.	.
SEP	.380 <T	.090 <T	.180 <T	.080 <T	BDL	.090 <T
NOV	.330 <T	.140 <T	.240 <T	.180 <T	.120 <T	.120 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)		
JAN	BDL	BDL	BDL	BDL	BDL	BDL
MAR	.640 <T	2.000 <T	2.000 <T	.670 <T	2.200 <T	2.400 <T
MAY	1.100 <T	3.300 <T	3.300 <T	3.200 <T	.	.
JUL	2.900 <T	.970 <T	2.200 <T	2.400 <T	.	.
SEP	1.600 <T	2.700 <T	3.400 <T	2.900 <T	2.900 <T	3.100 <T
NOV	1.300 <T	1.100 <T	.950 <T	.980 <T	.930 <T	.980 <T
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)		
JAN	5.700	BDL	53.000	7.600	54.000	9.000
MAR	3.500 <T	BDL	40.000	8.700	14.000	12.000
MAY	16.000	.740 <T	130.000	21.000	.	.
JUL	13.000	1.300 <T	91.000	6.900	.	.
SEP	6.600	.570 <T	160.000	13.000	18.000	15.000
NOV	4.200 <T	.870 <T	130.000	25.000	20.000	100.000
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)		
JAN	36.000 <T	BDL	78.000	40.000 <T	BDL	BDL
MAR	130.000	BDL	54.000 <T	120.000	BDL	9.500 <T
MAY	310.000	BDL	40.000 <T	45.000 <T	.	.
JUL	270.000	BDL	20.000 <T	20.000 <T	.	.
SEP	350.000	BDL	39.000 <T	26.000 <T	16.000 <T	BDL
NOV	340.000	BDL	34.000 <T	52.000 <T	6.700 <T	BDL
MERCURY (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 1 (A1)		
JAN	BDL	BDL	.	.	.	.
MAR	BDL	BDL	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUL	BDL	.040 <T	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)		
JAN	2.800	.980	2.900	2.300	.460 <T	.630
MAR	5.500	.870	3.100	6.500	.680	.620
MAY	16.000	.660	4.200	4.500	.	.
JUL	13.000	.110 <T	2.100	1.700	.	.
SEP	13.000	1.400	4.600	2.700	.660	.590
NOV	15.000	1.200	4.200	3.600	.710	.340 <T

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
JAN	.550	.800	.680	.730	.690	.560
MAR	.440 <T	.600	.560	.560	.620	.640
MAY	.320 <T	.670	.630	.730	.	.
JUL	.730	.870	.920	.890	.	.
SEP	.500 <T	.910	.830	.820	.870	.880
NOV	.290 <T	.720	.760	.740	.760	.820
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)		
JAN	.750 <T	1.100 <T	1.200 <T	.320 <T	.840 <T	.640 <T
MAR	BDL	BDL	.530 <T	BDL	BDL	BDL
MAY	1.500 <T	BDL	1.700 <T	.250 <T	.	.
JUL	.460 <T	BDL	1.700 <T	BDL	.	.
SEP	.300 <T	BDL	.930 <T	BDL	BDL	BDL
NOV	.500 <T	BDL	2.000 <T	BDL	.690 <T	.880 <T
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)		
JAN	.370 <T	BDL	.950	.110 <T	1.500	.330 <T
MAR	.710	BDL	.680	.160 <T	.080 <T	.070 <T
MAY	2.100	.080 <T	.980	.280 <T	.	.
JUL	2.100	.120 <T	.930	.270 <T	.	.
SEP	1.000	BDL	1.100	.240 <T	.310 <T	.160 <T
NOV	1.200	.110 <T	.960	.280 <T	.220 <T	.620
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)		
JAN	.350 <T	.410 <T	.450 <T	.390 <T	.410 <T	.480 <T
MAR	.420 <T	.340 <T	.300 <T	.260 <T	.270 <T	.500 <T
MAY	.170 <T	.280 <T	.380 <T	.280 <T	.	.
JUL	.250 <T	.230 <T	.340 <T	.250 <T	.	.
SEP	.420 <T	.510	.770	.470 <T	.550	.580
NOV	.330 <T	.330 <T	.540	.400 <T	.420 <T	.520
SELENIUM (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)		
JAN	BDL	1.600 <T	BDL	BDL	BDL	BDL
MAR	BDL	1.800 <T	1.200 <T	1.500 <T	1.400 <T	BDL
MAY	BDL	1.600 <T	BDL	1.100 <T	.	.
JUL	BDL	BDL	1.300 <T	BDL	.	.
SEP	BDL	BDL	2.400 <T	2.100 <T	1.100 <T	1.500 <T
NOV	BDL	BDL	BDL	BDL	BDL	BDL
STRONTIUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = N/A		
JAN	120.000	140.000	130.000	130.000	130.000	130.000
MAR	120.000	120.000	130.000	130.000	130.000	110.000
MAY	120.000	120.000	130.000	130.000	.	.
JUL	150.000	130.000	140.000	140.000	.	.
SEP	150.000	140.000	150.000	160.000	160.000	150.000
NOV	120.000	130.000	130.000	140.000	140.000	140.000

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
TITANIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = N/A		
JAN	2.600 <T	2.900 <T	3.700 <T	3.700 <T	3.600 <T	4.500 <T
MAR	4.700 <T	3.300 <T	3.300 <T	4.000 <T	3.800 <T	4.100 <T
MAY	7.600	6.400	6.700	6.600	.	.
JUL	9.700	7.300	7.200	7.500	.	.
SEP	7.300	5.300	5.300	5.300	6.100	6.000
NOV	5.600	3.900 <T	4.000 <T	4.000 <T	4.000 <T	3.900 <T
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)		
JAN	.240 <T	BDL	BDL	.060 <T	BDL	BDL
MAR	.280 <T	BDL	BDL	BDL	BDL	BDL
MAY	.310 <T	.070 <T	.070 <T	BDL	.	.
JUL	.410 <T	.100 <T	BDL	.080 <T	.	.
SEP	.300 <T	BDL	BDL	BDL	BDL	BDL
NOV	.290 <T	BDL	BDL	BDL	.060 <T	BDL
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
JAN	.250 <T	.650	.430 <T	.520	.650	.560
MAR	.450 <T	.530	.350 <T	.420 <T	.500 <T	.520
MAY	.760	.670	.430 <T	.510	.	.
JUL	.870	.700	.470 <T	.610	.	.
SEP	.960	.780	.510	.540	.710	.810
NOV	.640	.620	.430 <T	.480 <T	.540	.630
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)		
JAN	3.900	1.900 <T	49.000	1.800 <T	11.000	2.300
MAR	2.700	1.800 <T	50.000	3.000	9.800	5.000
MAY	6.300	1.700 <T	69.000	3.000	.	.
JUL	4.200	2.100	43.000	1.900 <T	.	.
SEP	4.200	1.200 <T	62.000	2.400	6.200	3.400
NOV	4.500	3.900	51.000	3.700	12.000	26.000

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS						
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 1900 (D4)		
JAN	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	1.000 <T	.	2.000 <T	.	3.000 <T

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 700 (G)	
JAN	1.000 <T	BDL	.	BDL	.	BDL
MAR	2.000 <T	BDL	.	BDL	.	BDL
MAY	1.000 <T	BDL	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.
SEP	1.000 <T	BDL	.	BDL	.	BDL
NOV	2.000 <T	BDL	.	BDL	.	BDL
LINDANE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 4000 (A1)	
JAN	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
NOV	2.000 <T	BDL	.	BDL	.	BDL
DIELDRIN (NG/L)			DET'N LIMIT = 2.000		GUIDELINE = 700 (A1)	
JAN	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	8.000 <T
NOV	BDL	BDL	.	BDL	.	BDL
ATRAZINE (NG/L)			DET'N LIMIT = 50		GUIDELINE = 60000 (A2)	
JAN	BDL	BDL	.	.	.	.
MAR	BDL	BDL	.	.	.	.
MAY	90.000 <T	BDL	.	.	.	.
JUL	130.000 <T	BDL	.	.	.	.
SEP	70.000 <T	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L PHENOLICS)			DET'N LIMIT = .2	GUIDELINE = 2 (A4)		
JAN	1.000	BDL	.	.	.	.
MAR	.400 <T	BDL	.	.	.	.
MAY	BDL	.400 <T	.	.	.	.
JUL	INR	INR	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	.600 <T	1.000	.	.	.	.

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
JAN	.150 <T	BDL	.	BDL	.	.050 <T
MAR	BDL	BDL	.	.050 <T	.	BDL
MAY	BDL	BDL	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)		
JAN	.200 <T	BDL	.	BDL	.	BDL
MAR	.050 <T	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
JAN	.050 <T	BDL	.	BDL	.	BDL
MAR	.150 <T	.050 <T	.	.100 <T	.	.150 <T
MAY	BDL	.050 <T	.	.050 <T	.	.
JUL	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	.050 <T	.	BDL
M-XYLENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)		
JAN	.100 <T	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
O-XYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)		
JAN	.100 <T	BDL	.	BDL	.	BDL
MAR	.050 <T	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
JAN	.250 <T	BDL	.	BDL	.	BDL
MAR	.350 <T	BDL	.	.050 <T	.	BDL
MAY	BDL	BDL	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.
SEP	.050 <T	BDL	.	BDL	.	BDL
NOV	.050 <T	BDL	.	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	BDL	10.500	.	11.200	.	14.000
MAR	BDL	11.500	.	7.900	.	11.000
MAY	BDL	8.800	.	10.100	.	.
JUL	BDL	12.900	.	16.500	.	.
SEP	BDL	7.900	.	10.400	.	15.000
NOV	BDL	10.000	.	11.100	.	19.200
111, TRICHLOROETHANE (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)		
JAN	.080 <T	.040 <T	.	BDL	.	.060 <T
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)		
JAN	BDL	7.350	.	7.150	.	7.900
MAR	BDL	7.250	.	7.150	.	7.600
MAY	BDL	7.400	.	8.150	.	.
JUL	BDL	8.250	.	9.000	.	.
SEP	BDL	5.750	.	7.000	.	7.150
NOV	BDL	7.350	.	8.100	.	8.300
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	BDL	2.900	.	2.700	.	2.600
MAR	BDL	4.000	.	4.100	.	3.800
MAY	BDL	4.400	.	4.500	.	.
JUL	BDL	4.200	.	4.500	.	.
SEP	BDL	3.200	.	3.900	.	3.800
NOV	BDL	3.200	.	3.300	.	3.100
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (D1)		
JAN	.200 <T	.050 <T	.	BDL	.	BDL
MAR	.050 <T	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
BROMOFORM (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (A1+)		
JAN	BDL	.400 <T	.	.800 <T	.	.400 <T
MAR	BDL	.600 <T	.	.600 <T	.	.400 <T
MAY	BDL	.400 <T	.	.400 <T	.	.
JUL	BDL	.600 <T	.	.600 <T	.	.
SEP	BDL	.600 <T	.	.800 <T	.	.800 <T
NOV	BDL	.400 <T	.	.400 <T	.	.400 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM AMHERSTBURG WSS 1990

		WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
TOTL TRIHALOMETHANES (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)		
JAN	BDL	21.250	.	21.900	.	24.750
MAR	BDL	23.350	.	19.750	.	22.800
MAY	BDL	20.950	.	23.250	.	.
JUL	BDL	25.950	.	30.600	.	.
SEP	BDL	17.450	.	21.950	.	26.650
NOV	BDL	20.850	.	22.900	.	30.850

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.
USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF

OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled
Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)

Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)

Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top

Steps:

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.